AMENDMENTS TO THE CLAIMS

Claim 1 (Currently amended): A method of patterning redox-active polymers on a surface to form surface-bound redox-active polymers, said method comprising:

providing redox-active molecules bearing at least a first reactive site or group and a second reactive site or group, wherein said first reactive site or group is a species reactive with said second reactive site or group; and

contacting said surface with said redox-active molecules, where said contacting is under conditions that result in attachment of said redox-active molecules to said surface via said first reactive site or group, and attachment of redox-active molecules directly to each other via a reaction between the first reactive site or group on one redox-active molecule and the second reactive site or group on the attached redox-active molecule ~~via their reactive site or group to the second reactive site or group on the redox-active molecules attached to said surface~~, thereby forming a polymer attached to said surface where said polymers comprise at least two of said redox-active molecules.

Claim 2 (Original): The method of claim 1, wherein said first reactive site or group and said second reactive site or group are the same species.

Claim 3 (Original): The method of claim 1, wherein said first reactive site or group and said second reactive site or group are different species.

Claim 4 (Original): The method of claim 1, wherein said first reactive site or group and/or said second reactive site or group is attached to said redox-active molecule by a linker.

Claim 5 (Original): The method of claim 1, wherein said first reactive site or group is an ethynyl group.

Claim 6 (Original): The method of claim 5, wherein said second reactive site or group is an ethynyl group.

Claim 7 (Original): The method of any of claims 5 or 6, wherein said ethynyl group is an ethynyl group selected from the group consisting of ethynyl, 4-ethynylphenyl, 3-ethynylphenyl, 4-ethynylbiphenyl, 3-ethynylphenyl, 4-ethynylterphenyl, and 3-ethynylterphenyl.

Claim 8 (Original): The method of claim 1, wherein said redox-active molecule is selected from the group consisting of a porphyrinic macrocycle, a porphyrin, a sandwich coordination compound of porphyrinic macrocycles, and a metallocene.

Claim 9 (Original): The method of claim 1, wherein said redox-active molecule is selected from the group consisting of a linear polyene, a cyclic polyene, a heteroatom-substituted linear polyene, a heteroatom-substituted cyclic polyene, a tetrathiafulvalene, a tetraselenafulvalene, a metal coordination complex, a buckyball, a triarylamine, a 1,4-phenylenediamine, a xanthene, a flavin, a phenazine, a phenothiazine, an acridine, a quinoline, a 2,2'-bipyridyl, a 4,4'-bipyridyl, a tetrathiotetracene, and a peri-bridged naphthalene dichalcogenide.

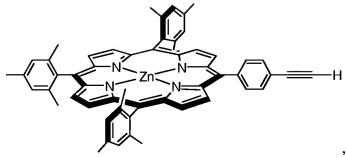
Claim 10 (Original): The method of claim 1, wherein said redox-active molecule is a porphyrin comprising a substituent selected from the group consisting of: aryl, phenyl, cycloalkyl, alkyl, halogen, alkoxy, alkylthio, perfluoroalkyl, perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, alkylamino, acyl, sulfoxyl, sulfonyl, amido, and carbamoyl.

Claim 11 (Original): The method of claim 1, wherein said redox-active molecule is a porphyrin comprising a substituent selected from the group consisting of: 4-methylphenyl, 4-*t*-butylphenyl, 4-trifluoromethylphenyl, pentyl, and H (no substituent).

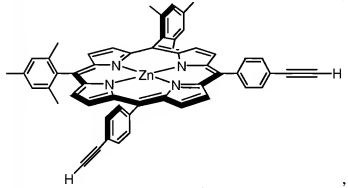
Claim 12 (Original): The method of claim 1, wherein said redox-active molecule is a phthalocyanine comprising a substituent selected from the group consisting of aryl, phenyl, cycloalkyl, alkyl, halogen, alkoxy, alkylthio, perfluoroalkyl, perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, alkylamino, acyl, sulfoxyl, sulfonyl, amido, and carbamoyl.

Claim 13 (Original): The method of claim 1, wherein said redox-active molecule is a phthalocyanine comprising a substituent selected from the group consisting of methyl, *t*-butyl, butoxy, fluoro, and H (no substituent).

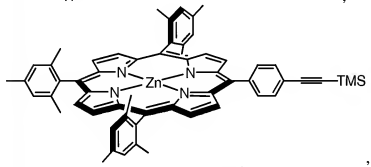
Claim 14 (Previously presented): The method of claim 1, wherein said redox-active molecule is selected from the group consisting of:


Zn
N
H

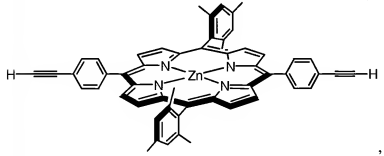
,


Zn
N
H

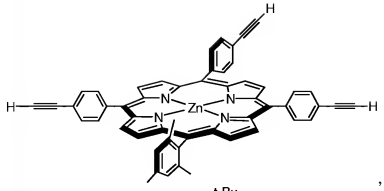
,


Zn
N
TMS

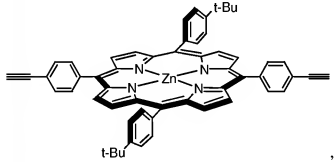
,


Zn
N
H

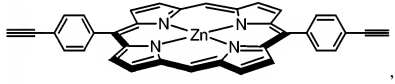
,


H
H
H
N
N
Zn
N
N

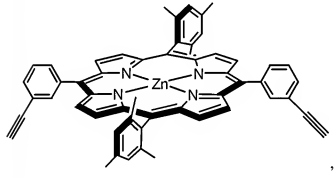
,


t-Bu
t-Bu
N
N
Zn
N
N

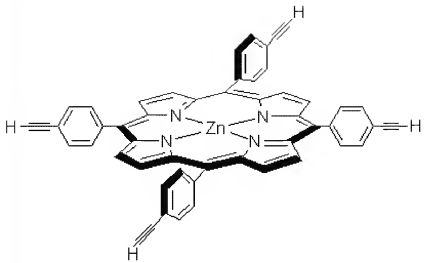
,


N
N
Zn
N
N

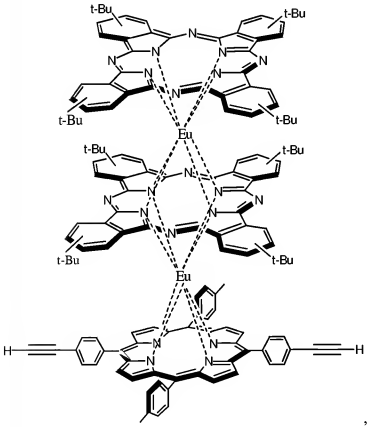
,


N
N
Zn
N
N

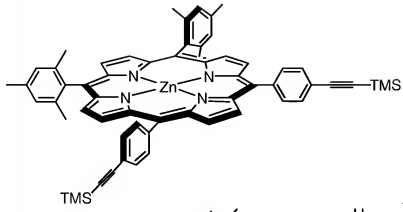
,



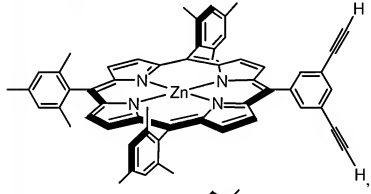
"



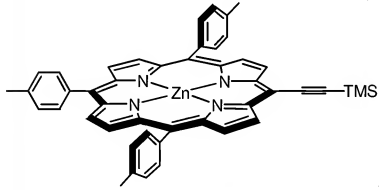
,


N
N
Zn
N
N
TMS
TMS

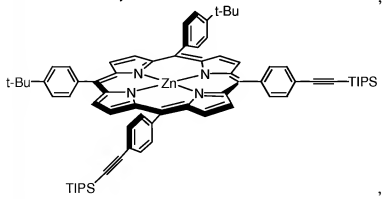
,


N
N
Zn
N
N
H
H

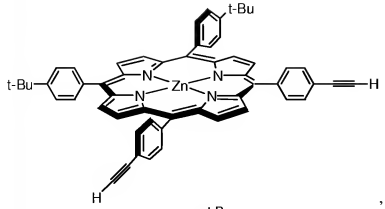
,


N
N
Zn
N
N
TMS

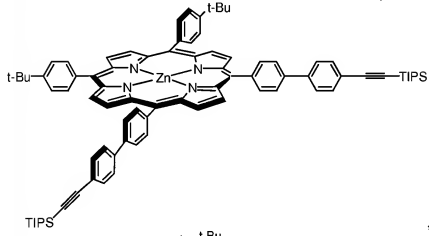
,


t-Bu
t-Bu
N
N
Zn
N
N
TIPS
TIPS

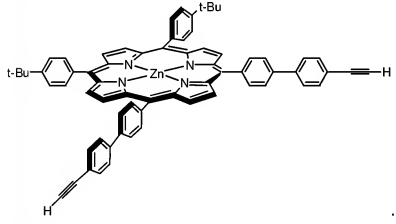
,



,



, and



.

Claim 15 (Original): The method of claim 1, wherein said contacting comprises contacting said surface with a linker having the formula

$$Y^1\text{-}L^1\text{-}Z^1$$

wherein

Z^1 is a surface attachment group;

L^1 is a covalent bond or a linker; and

Y^1 is a protected or unprotected reactive site or group;

whereby said linker attaches to said surface; and

contacting the attached linker with said redox-active molecules whereby the redox-active molecules couple to each other via said first and/or said second reactive site or group and the redox-active molecules couple to the linker through Y^1 and said first and/or said second reactive site or group thereby forming a polymer attached to said linker where said polymer comprises at least two of said redox-active molecules.

Claim 16 (Original): The method of claim 15, wherein Z^1 is a protected or unprotected reactive site or group selected from the group consisting of a carboxylic acid, an alcohol, a thiol, a selenol, a tellurol, a phosphonic acid, a phosphonothioate, an amine, a nitrile, 4-formylphenyl, 4-(bromomethyl)phenyl, 4-vinylphenyl, 4-ethynylphenyl, 4-allylphenyl, 4-[2-(trimethylsilyl)ethynyl]phenyl, 4-[2-(triisopropylsilyl)ethynyl]phenyl, 4-bromophenyl, 4-iodophenyl, 4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl, bromo, iodo, formyl, bromomethyl, chloromethyl, ethynyl, vinyl, allyl, 4-(ethynyl)biphen-4'-yl, 4-[2-(triisopropylsilyl)ethynyl]biphen-4'-yl, 3,5-diethynylphenyl, and 2-bromoethyl.

Claim 17 (Original): The method of claim 15, wherein $-L^1-Z^1-$ is selected from the group consisting of 4-carboxyphenyl, carboxymethyl, 2-carboxyethyl, 3-carboxypropyl, 2-(4-carboxyphenyl)ethynyl, 4-(2-(4-carboxyphenyl)ethynyl)phenyl, 4-carboxymethylphenyl, 4-(3-carboxypropyl)phenyl, 4-(2-(4-carboxymethylphenyl)ethynyl)phenyl; 4-hydroxyphenyl, hydroxymethyl, 2-hydroxyethyl, 3-hydroxypropyl, 2-(4-hydroxyphenyl)ethynyl, 4-(2-(4-hydroxyphenyl)ethynyl)phenyl, 4-hydroxymethylphenyl, 4-(2-hydroxyethyl)phenyl, 4-(3-hydroxypropyl)phenyl, 4-(2-(4-hydroxymethylphenyl)ethynyl)phenyl; 4-mercaptophenyl, mercaptomethyl, 2-mercaptoethyl, 3-mercaptopropyl, 2-(4-mercaptophenyl)ethynyl, 4-(2-(4-mercaptophenyl)ethynyl)phenyl, 4-mercaptomethylphenyl, 4-(2-mercaptoethyl)phenyl, 4-(3-mercaptopropyl)phenyl, 4-(2-(4-mercaptomethylphenyl)ethynyl)phenyl; 4-selenylphenyl, selenylmethyl, 2-selenylethyl, 3-selenylpropyl, 2-(4-selenylphenyl)ethynyl, 4-selenylmethylphenyl, 4-(2-selenylethyl)phenyl, 4-(3-selenylpropyl)phenyl, 4-selenylmethylphenyl, 4-(2-(4-selenylphenyl)ethynyl)phenyl; 4-tellurylphenyl, tellurylmethyl, 2-tellurylethyl, 3-tellurylpropyl, 2-(4-tellurylphenyl)ethynyl, 4-(2-(4-tellurylphenyl)ethynyl)phenyl, 4-tellurylmethylphenyl, 4-(2-tellurylethyl)phenyl, 4-(3-

tellurylpropyl)phenyl, 4-(2-(4-tellurylmethylphenyl)ethynyl)phenyl; 4-(dihydroxyphosphoryl)phenyl, (dihydroxyphosphoryl)methyl, 2-(dihydroxyphosphoryl)ethyl, 3-(dihydroxyphosphoryl)propyl, 2-[4-(dihydroxyphosphoryl)phenyl]ethynyl, 4-[2-[4-(dihydroxyphosphoryl)phenyl]ethynyl]phenyl, 4-[(dihydroxyphosphoryl)methyl]phenyl, 4-[2-(dihydroxyphosphoryl)ethyl]phenyl, 4-[2-[4-(dihydroxyphosphoryl)methylphenyl]ethynyl]phenyl; 4-(hydroxy(mercapto)phosphoryl)phenyl, (hydroxy(mercapto)phosphoryl)methyl, 2-(hydroxy(mercapto)phosphoryl)ethyl, 3-(hydroxy(mercapto)phosphoryl)propyl, 2-[4-(hydroxy(mercapto)phosphoryl)phenyl]ethynyl, 4-[2-[4-(hydroxy(mercapto)phosphoryl)phenyl]ethynyl]phenyl, 4-[(hydroxy(mercapto)phosphoryl)methyl]phenyl, 4-[2-(hydroxy(mercapto)phosphoryl)ethyl]phenyl, 4-[2-[4-(hydroxy(mercapto)phosphoryl)methylphenyl]ethynyl]phenyl; 4-cyanophenyl, cyanomethyl, 2-cyanoethyl, 3-cyanopropyl, 2-(4-cyanophenyl)ethynyl, 4-[2-(4-cyanophenyl)ethynyl]phenyl, 4-(cyanomethyl)phenyl, 4-(2-cyanoethyl)phenyl, 4-[2-[4-(cyanomethyl)phenyl]ethynyl]phenyl; 4-cyanobiphenyl, 4-aminophenyl, aminomethyl, 2-aminoethyl, 3-aminopropyl, 2-(4-aminophenyl)ethynyl, 4-[2-(4-aminophenyl)ethynyl]phenyl, and 4-aminobiphenyl.

Claim 18 (Original): The method of claim 15, wherein L is selected from the group consisting of a covalent bond, 1,4-phenylene, 4,4′-diphenylethyne, 4,4′-diphenylbutadiyne, 4,4′-biphenyl, 4,4′-stilbene, 1,4-bicyclooctane, 4,4′-azobenzene, 4,4′-benzylideneaniline, and 4,4″-terphenyl.

Claim 19 (Original): The method of claim 15, wherein said method further comprises attaching a counterelectrode to said polymer.

Claim 20 (Original): The method of claim 19, wherein said counterelectrode is attached directly to said polymer.

Claim 21 (Original): The method of claim 19, wherein said counterelectrode is attached to said polymer through a linker.

Claim 22 (Original): The method of claim 15, wherein said redox-active molecules further comprise redox-active molecules having only one available reactive group or site.

Claim 23 (Original): The method of claim 22, wherein said redox-active molecules having only one available reactive group or site comprise a second reactive group or site that is blocked.

Claim 24 (Original): The method of claim 1, wherein said surface comprises a material selected from the group consisting of a Group III element, a Group IV element, a Group V element, a doped Group III element, a doped Group IV element, a doped Group V element, a transition metal, a transition metal oxide, and a transition metal nitride.

Claim 25 (Original): The method of claim 24, wherein said surface comprises a material selected from the group consisting of silicon, germanium, doped silicon, and doped germanium.

Claim 26 (Original): The method of claim 24, wherein said surface is a hydrogen passivated surface.

Claim 27 (Currently amended): A method of patterning redox-active polymers on a surface to form surface-bound redox-active polymers, said method comprising:

providing a surface having attached thereto a linker bearing a reactive site or group and/or a redox-active molecule bearing a reactive site or group;

providing redox-active molecules bearing at least a first reactive site or group and a second reactive site or group, wherein said first reactive site or group is a species reactive with said second reactive site or group; and

contacting said surface with said redox-active molecules, where said contacting is under conditions that result in the attachment of redox-active molecules to the linker via the first reactive site, and attachment of redox active molecules directly to each other via a reaction between the first reactive site or group on one redox-active molecule and the second reactive site or group on the attached redox-active molecule ~~via their first reactive site to the second reactive site of redox active molecules attached to the surface~~, thereby forming polymers attached to said surface where said polymers comprise at least two of said redox-active molecules.

Claim 28 (Original): The method of claim 27, wherein said first reactive site or group and said second reactive site or group are the same species.

Claim 29 (Original): The method of claim 27, wherein said first reactive site or group and said second reactive site or group are different species.

Claim 30 (Original): The method of claim 27, wherein said first reactive site or group and/or said second reactive site or group is attached to said redox-active molecule by a linker.

Claim 31 (Original): The method of claim 27, wherein said first reactive site or group is an ethynyl group.

Claim 32 (Original): The method of claim 31, wherein said second reactive site or group is an ethynyl group.

Claim 33 (Original): The method of any of claims 31 or 32, wherein said ethynyl group is an ethynyl group selected from the group consisting of ethynyl, 4-ethynylphenyl, 3-ethynylphenyl, 4-ethynylbiphenyl, 3-ethynylphenyl, 4-ethynylterphenyl, and 3-ethynylterbiphenyl.

Claim 34 (Original): The method of claim 27, wherein said redox-active molecule is selected from the group consisting of a porphyrinic macrocycle, a porphyrin, a sandwich coordination compound of porphyrinic macrocycles, and a metallocene.

Claim 35 (Original): The method of claim 27, wherein said redox-active molecule is selected from the group consisting of a linear polyene, a cyclic polyene, a heteroatom-substituted linear polyene, a heteroatom-substituted cyclic polyene, a tetrathiafulvalene, a tetraselenafulvalene, a metal coordination complex, a buckyball, a triarylamine, a 1,4-phenylenediamine, a xanthene, a flavin, a phenazine, a phenothiazine, an acridine, a quinoline, a 2,2'-bipyridyl, a 4,4'-bipyridyl, a tetrathiotetracene, and a peri-bridged naphthalene dichalcogenide.

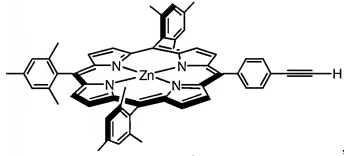
Claim 36 (Original): The method of claim 27, wherein said redox-active molecule is a porphyrin comprising a substituent selected from the group consisting of: aryl, phenyl, cycloalkyl, alkyl, halogen, alkoxy, alkylthio, perfluoroalkyl, perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, alkylamino, acyl, sulfoxyl, sulfonyl, amido, and carbamoyl.

Claim 37 (Original): The method of claim 27, wherein said redox-active molecule is a porphyrin comprising a substituent selected from the group consisting of: 4-methylphenyl, 4-*t*-butylphenyl, 4-trifluoromethylphenyl, pentyl, and H (no substituent).

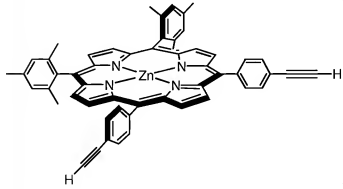
Claim 38 (Original): The method of claim 27, wherein said redox-active molecule is a phthalocyanine comprising a substituent selected from the group consisting of aryl, phenyl, cycloalkyl, alkyl, halogen, alkoxy, alkylthio, perfluoroalkyl, perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, alkylamino, acyl, sulfoxyl, sulfonyl, amido, and carbamoyl.

Claim 39 (Original): The method of claim 27, wherein said redox-active molecule is a phthalocyanine comprising a substituent selected from the group consisting of methyl, *t*-butyl, butoxy, fluoro, and H (no substituent).

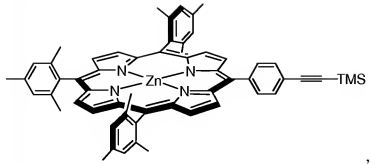
Claim 40 (Previously presented): The method of claim 27, wherein said redox-active molecule is a molecule selected from the group consisting of:



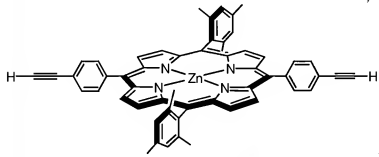
,



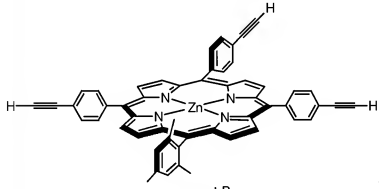
,


N
Zn
N
N
N
TMS

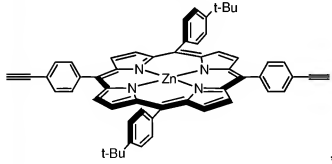
,


H
N
Zn
N
N
N
H

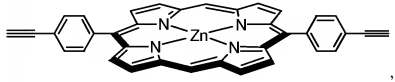
,


H
H
N
Zn
N
N
N
H

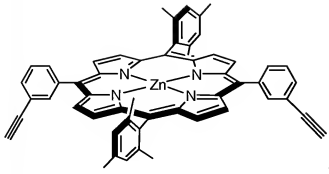
,


t-Bu
N
Zn
N
N
N
t-Bu

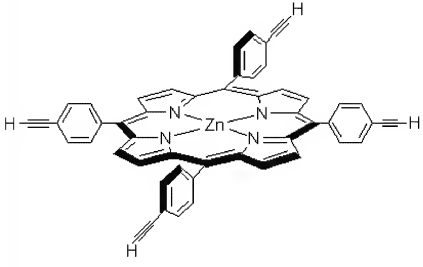
,


N
Zn
N
N
N

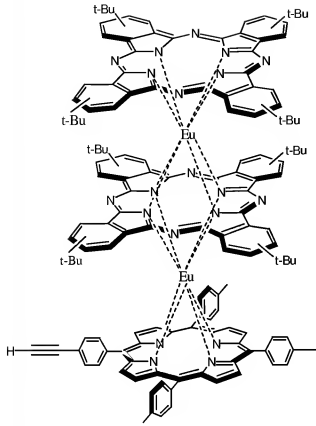
,


N
N
Zn
N
N

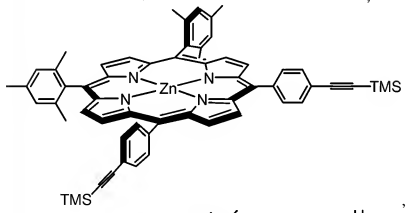
,


H
N
N
Zn
N
N
H
H
H

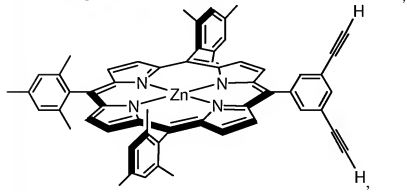
,


t-Bu
Eu
H
N

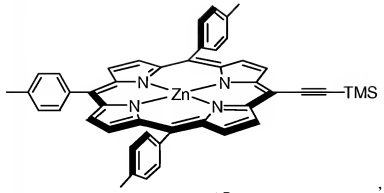
,


N
Zn
TMS

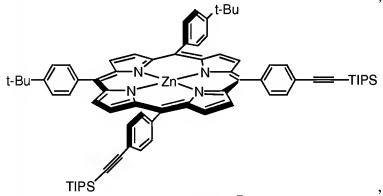
,


N
Zn
H

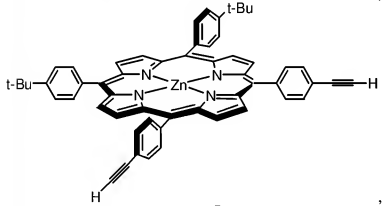
,


N
Zn
N
N
N
TMS

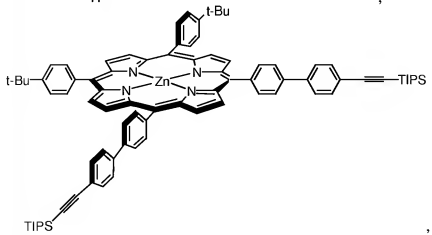
,


t-Bu
t-Bu
N
Zn
N
N
N
TIPS
TIPS

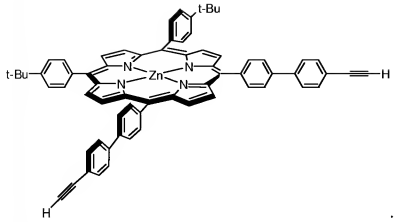
,


t-Bu
t-Bu
N
Zn
N
N
N
H
H

,


t-Bu
t-Bu
N
Zn
N
N
N
TIPS
TIPS

, and



Claim 41 (Original): The method of claim 27, wherein said providing comprises providing a surface having attached thereto a linker whereby said surface and linker have the formula

$$S\text{-}Z^1\text{-}L^1\text{-}Y^1$$

wherein

S is the surface;

Z^1 is a surface attachment group;

L^1 is a covalent bond or a linker; and

Y^1 is a protected or unprotected reactive site or group.

Claim 42 (Original): The method of claim 41, wherein Y^1 is a protected reactive site our group and said method further comprises deprotecting Y^1.

Claim 43 (Original): The method of claim 41, wherein Z^1, before coupling to said surface, is a protected or unprotected reactive site or group selected from the group consisting of a carboxylic acid, an alcohol, a thiol, a selenol, a tellurol, a phosphonic acid, a phosphonothioate, an amine, a nitrile, 4-formylphenyl, 4-(bromomethyl)phenyl, 4-vinylphenyl, 4-ethynylphenyl, 4-allylphenyl, 4-[2-(trimethylsilyl)ethynyl]phenyl, 4-[2-(triisopropylsilyl)ethynyl]phenyl, 4-bromophenyl, 4-iodophenyl, 4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl, bromo, iodo, formyl, bromomethyl, chloromethyl, ethynyl, vinyl, allyl, 4-(ethynyl)biphen-4'-yl, 4-[2-(triisopropylsilyl)ethynyl]biphen-4'-yl, 3,5-diethynylphenyl, and 2-bromoethyl.

Claim 44 (Original): The method of claim 41, wherein Z^1-L^1, before coupling to said surface, is selected from the group consisting of 4-carboxyphenyl, carboxymethyl, 2-carboxyethyl, 3-carboxypropyl, 2-(4-carboxyphenyl)ethynyl, 4-(2-(4-carboxyphenyl)ethynyl)phenyl, 4-carboxymethylphenyl, 4-(3-carboxypropyl)phenyl, 4-(2-(4-carboxymethylphenyl)ethynyl)phenyl; 4-hydroxyphenyl, hydroxymethyl, 2-hydroxyethyl, 3-hydroxypropyl, 2-(4-hydroxyphenyl)ethynyl, 4-(2-(4-hydroxyphenyl)ethynyl)phenyl, 4-hydroxymethylphenyl, 4-(2-hydroxyethyl)phenyl, 4-(3-hydroxypropyl)phenyl, 4-(2-(4-hydroxymethylphenyl)ethynyl)phenyl; 4-mercaptophenyl, mercaptomethyl, 2-mercaptoethyl, 3-mercaptopropyl, 2-(4-mercaptophenyl)ethynyl, 4-(2-(4-mercaptophenyl)ethynyl)phenyl, 4-mercaptomethylphenyl, 4-(2-mercaptoethyl)phenyl, 4-(3-mercaptopropyl)phenyl, 4-(2-(4-mercaptomethylphenyl)ethynyl)phenyl; 4-selenylphenyl, selenylmethyl, 2-selenylethyl, 3-selenylpropyl, 2-(4-selenylphenyl)ethynyl, 4-selenylmethylphenyl, 4-(2-selenylethyl)phenyl, 4-(3-selenylpropyl)phenyl, 4-selenylmethylphenyl, 4-(2-(4-selenylphenyl)ethynyl)phenyl; 4-tellurylphenyl, tellurylmethyl, 2-tellurylethyl, 3-tellurylpropyl, 2-(4-tellurylphenyl)ethynyl, 4-(2-(4-tellurylphenyl)ethynyl)phenyl, 4-tellurylmethylphenyl, 4-(2-tellurylethyl)phenyl, 4-(3-tellurylpropyl)phenyl, 4-(2-(4-tellurylmethylphenyl)ethynyl)phenyl; 4-(dihydroxyphosphoryl)phenyl, (dihydroxyphosphoryl)methyl, 2-(dihydroxyphosphoryl)ethyl, 3-(dihydroxyphosphoryl)propyl, 2-[4-(dihydroxyphosphoryl)phenyl]ethynyl, 4-[2-[4-(dihydroxyphosphoryl)phenyl]ethynyl]phenyl, 4-[(dihydroxyphosphoryl)methyl]phenyl, 4-[2-(dihydroxyphosphoryl)ethyl]phenyl, 4-[2-[4-(dihydroxyphosphoryl)methylphenyl]ethynyl]phenyl; 4-(hydroxy(mercapto)phosphoryl)phenyl, (hydroxy(mercapto)phosphoryl)methyl, 2-(hydroxy(mercapto)phosphoryl)ethyl, 3-(hydroxy(mercapto)phosphoryl)propyl, 2-[4-(hydroxy(mercapto)phosphoryl)phenyl]ethynyl, 4-[2-[4-(hydroxy(mercapto)phosphoryl)phenyl]ethynyl]phenyl, 4-[(hydroxy(mercapto)phosphoryl)methyl]phenyl, 4-[2-(hydroxy(mercapto)phosphoryl)ethyl]phenyl, 4-[2-[4-(hydroxy(mercapto)phosphoryl)methylphenyl]ethynyl]phenyl; 4-cyanophenyl, cyanomethyl, 2-cyanoethyl, 3-cyanopropyl, 2-(4-cyanophenyl)ethynyl, 4-[2-(4-cyanophenyl)ethynyl]phenyl, 4-(cyanomethyl)phenyl, 4-(2-cyanoethyl)phenyl, 4-[2-[4-(cyanomethyl)phenyl]ethynyl]phenyl; 4-cyanobiphenyl, 4-aminophenyl, aminomethyl, 2-aminoethyl, 3-aminopropyl, 2-(4-aminophenyl)ethynyl, 4-[2-(4-aminophenyl)ethynyl]phenyl, and 4-aminobiphenyl.

Claim 45 (Original): The method of claim 41, wherein L^1 is selected from the group consisting of a covalent bond, 1,4-phenylene, 4,4′-diphenylethyne, 4,4′-diphenylbutadiyne, 4,4′-biphenyl, 4,4′-stilbene, 1,4-bicyclooctane, 4,4′-azobenzene, 4,4′-benzylideneaniline, and 4,4″-terphenyl.

Claim 46 (Original): The method of claim 27, wherein said method further comprises attaching a counterelectrode to said polymer.

Claim 47 (Original): The method of claim 46, wherein said counterelectrode is attached directly to said polymer.

Claim 48 (Original): The method of claim 46, wherein said counterelectrode is attached to said polymer through a linker.

Claim 49 (Original): The method of claim 27, wherein said redox-active molecules further comprise redox-active molecules having only one available reactive group or site.

Claim 50 (Original): The method of claim 49, wherein said redox-active molecules having only one available reactive group or site comprise a second reactive group or site that is blocked.
Claims 51-97 (Canceled).